What is claimed is:

1. A method of measuring cavitation in a fluid, the method comprising:

sensing energy pulses associated with a plurality of cavitation events in a selected volume of the fluid; and

discriminating against cavitation events that occur in the fluid outside the selected volume.

2. The method of claim 1 wherein the method includes measuring the cavitation density of the selected volume in the fluid.

3. The method of claim 1 wherein the method includes measuring the cavitation intensity of the cavitation events in the selected volume in the fluid.

4. The method of claim 1 wherein the sensing step includes directly detecting the energy perturbations associated with the cavitation events in the selected volume in the fluid.

5. The method of claim 1 wherein the sensing step includes continuously detecting the energy perturbations associated with the cavitation events in the selected volume in the fluid.

6. The method of claim 1 wherein the method includes measuring the distribution of the cavitation events in the selected volume in the fluid.

7. The method of claim 1 wherein the sensing step includes the energy perturbations associated with the cavitation events are generated in a spatially random distribution within the selected volume in the fluid.

8. A method of mapping the distribution of cavitation events within a selected volume of a fluid, the method comprising:

sensing energy pulses associated with a plurality of cavitation events in a selected volume at a first location within the fluid;

sensing energy pulses associated with a plurality of cavitation events in a selected volume at a second location within the fluid; and

identifying by three dimensional coordinates within the fluid the specific locations of the first and second selected volumes and the respective cavitation events for each of the selected volumes.

9. The method of claim 8 wherein the method includes measuring the cavitation density of the selected volume in the fluid.

10. The method of claim 8 wherein the method includes measuring the cavitation intensity of the cavitation events in the selected volume in the fluid.

11. The method of claim 8 wherein the sensing steps are performed simultaneously.

12. A method for detecting the presence of cavitation in a fluid, the method comprising:

receiving at a thin plate a selected first energy perturbation associated with a cavitation in a first selected fluid, the thin plate separating the first selected fluid from a second selected fluid, and thereby creating a second energy perturbation in the second fluid;

converting the second energy perturbation into at least one electromagnetic pulse of energy;

receiving a signal representing the at least one electromagnetic pulse at a photomultiplier positioned adjacent to a selected surface of the second fluid, thereby creating an electronic signal; and

interpreting presence of the electronic signal as indicating that a cavitation void has occurred in the first fluid.

13. The method of claim 12, further comprising providing a light-proof container, having the thin plate on at least one wall, to hold the second fluid.

14. The method of claim 13, further comprising choosing the light-proof container to have at least one container wall that is constructed of a material drawn from the group of materials consisting of an Al alloy, a carbon composite polyetheretherketone (PEEK), poly(amide-imide) and polyphenylene sulfide (PPS).

15. The method of claim 12, further comprising receiving the first energy perturbation at the thin plate having the plate thickness no greater than about 0.25 mm.

16. The method of claim 12, further comprising detecting the electronic signal in a time interval that ends no later than about 1000 nsec after providing the perturbation in the first fluid.

17. The method of claim 12, further comprising detecting a number of the electronic signals that occur in a time interval of length in a selected range 1 - 1000 msec.

18. The method of claim 12, further comprising providing the first energy perturbation with an energy level no more than about 100 ergs.

19. The method of claim 12, further comprising selecting at least one of the first fluid and the second fluid from a group of fluids consisting of water, deionized water, isopropyl alcohol, ethyl alcohol, methyl alcohol, tetrahydrofuran, acetone, perfluorohexane, hexane, ether, hydrofluoroether, NH_4OH, HCl, H_2S0_4, HNO_3 and H_20_2.

20. The method of claim 12, further comprising providing the same fluid for the first fluid and the second fluid.